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Thrombotic Occlusion of an Inferior Vena Cava Filter during Maintenance with a Novel Anticoagulant

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A 68-year-old woman presented with chest pain and dyspnea and was diagnosed with a massive pulmonary embolism. Bleeding colon cancer was detected incidentally during anticoagulation therapy. After stabilization, she underwent surgical resection of the cancer with insertion of an inferior vena cava filter and was treated with rivaroxaban as antithrombotic therapy thereafter. Unexpectedly, thrombotic obstruction of the filter was revealed on a computed tomography scan taken in preparation for removing the device. After switching to warfarin, the obstruction had resolved at the 4-week follow-up examination. We discuss what to consider when performing antithrombotic therapy in patients with an inferior vena cava filter. (Korean J Med 2016;90:524-527)

Keywords: Vena cava filters; Thrombosis; Rivaroxaban

INTRODUCTION

An inferior vena cava (IVC) filter can be adopted as a preventive measure for pulmonary thromboembolism in patients at high risk for venous thromboembolism and bleeding. Anticoagulation therapy usually must be maintained after introducing these filters [1]. A novel oral anticoagulant can be used depending on the patient's condition; however, an IVC filter can become oc-

cluded by thrombosis even under anticoagulation therapy. The exact causes of or risk factors for this complication are not fully understood. In this case report, we describe the case of a 68-year-old female patient who had an acute pulmonary embolism and bleeding colon cancer. An IVC filter was implanted but totally obstructed the vessel during anticoagulation therapy after cancer resection. The possible mechanism and clinical implications of this event are discussed.

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CASE REPROT

A 68-year-old woman presented to our outpatient cardiology department complaining of episodes of chest pain and dyspnea over the past 10 days. She had experienced severe exercise-induced chest pain and dyspnea while under mental stress traveling across Korea. She had a history of hypercholesterolemia but was not taking a lipid-lowering medication. Although her vital signs were stable, she showed deep T wave inversion on the electrocardiography inferolateral leads and severe right ventricular hypokinesia on echocardiography. She underwent coronary angiography after hospitalization, but no significant coronary artery stenosis was noted. A subsequent computed tomography (CT) scan revealed an extensive bilateral pulmonary embolism and deep vein thrombosis in the right calf vein, and she was started on intravenous heparin (Fig. 1). Laboratory results reported later did not show any hematological or immunological disease predisposing her to thrombosis.

She began to complain of anal bleeding on hospital day 3. A colonoscopy revealed a 5 cm ulcero-fungating, bleeding mass in the sigmoid colon that was ultimately diagnosed as adenocarcinoma (Fig. 2). Accordingly, heparin treatment was stopped. After a staging work-up and discussion with the surgical team, operative resection of the cancer was planned. To reduce the risk of thromboembolism during the period without anticoagulation, an IVC filter (Celect, Cook Medical Inc., Bloomington, IN, USA) was introduced into the infrarenal IVC on hospital day 8. She underwent laparoscopic resection of the sigmoid colon on hospital day 12, and 40 mg subcutaneous enoxaparin b.i.d. was started after achieving hemostasis. She was discharged after a gradual recovery and has maintained self-administration of subcutaneous heparin.

Her condition was good at the 2-week follow-up after discharge, and enoxaparin was switched to 20 mg rivaroxaban daily. A venous CT scan taken 10 days later and prior to removing the IVC filter showed a large thrombus within the filter occluding the IVC (Fig. 3A). This filter thrombus was likely an *in situ* thrombosis because it was clearly larger than the residual thrombus in the right calf vein. However, it was round, and the possibility of migration of the deep vein thrombus could not be com-

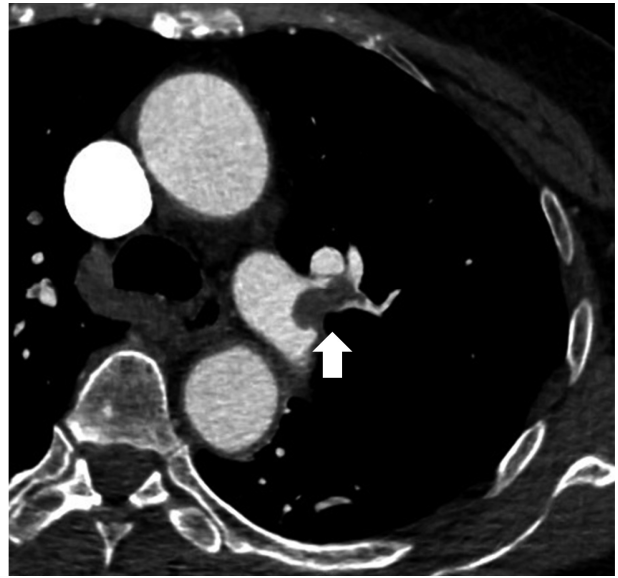


Figure 1. Chest computed tomography scan reveals an extensive bilateral pulmonary embolism (arrow).

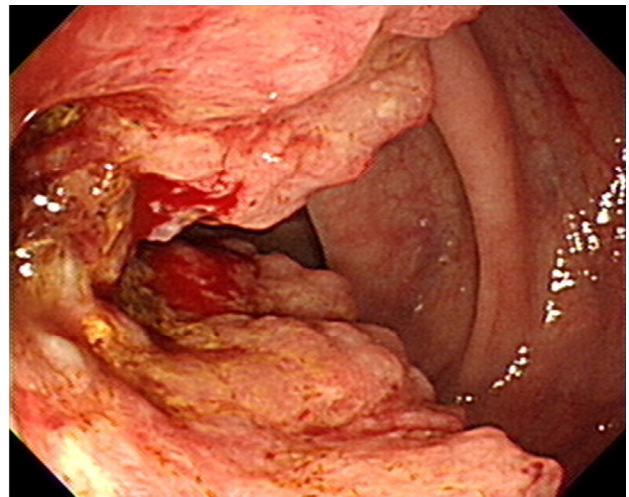


Figure 2. Colonoscopy reveals a 5 cm ulcero-fungating, bleeding mass in the sigmoid colon.

pletely ruled out. She did not appear to be in any discomfort or show signs of the occlusion. We changed the rivaroxaban to warfarin and adjusted the dose to 3 mg daily. A follow-up venous CT scan 4 weeks later showed resolution of the thrombus, and the filter was removed uneventfully (Fig. 3B).

DISCUSSION

IVC filters are usually inserted when anticoagulation therapy is contraindicated or as an adjunct to anticoagulation. Thrombotic

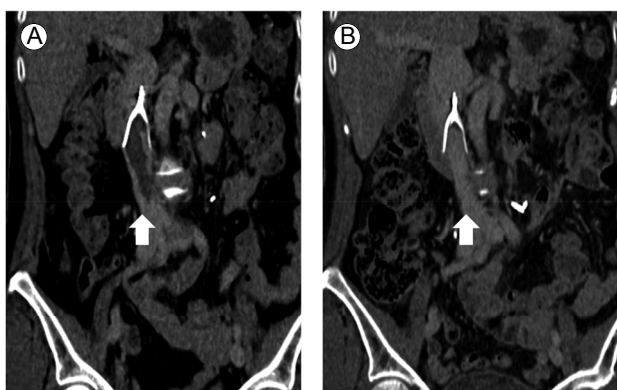


Figure 3. Venous computed tomography scan shows large thrombi (arrow) within the filter occluding the inferior vena cava (A). Follow-up imaging after warfarin therapy reveals complete resolution of the thrombi (arrow) (B).

ic occlusion of these filters is reported in 2-30% of cases [2]. Anticoagulation after inserting an IVC filter is reportedly associated with a lower incidence of thrombosis but no quality studies have been published on filter thrombosis [3]. Cancer is a well-known risk factor for thrombosis [4]. In addition, filter design and the resulting flow dynamics contribute to thrombotic occlusion [5]. Because the thrombosis in the present case developed during rivaroxaban therapy and resolved after administration of warfarin, drug-related factors such as poor compliance or a lower response to rivaroxaban may have contributed to the thrombosis in this specific patient. However, we could not accurately determine which factors contributed to the thrombotic occlusion in this case.

Although many patients at risk for bleeding are ineligible for systemic anticoagulation therapy, our patient stably recovered after the cancer was resected and underwent anticoagulation therapy. Low molecular weight heparin (LMWH) is recommended in the current guidelines for patients with cancer undergoing abdominal surgery or secondary prophylaxis for a venous thromboembolism [6]. Moreover, a meta-analysis showed that LMWH has better efficacy than vitamin K antagonists during long-term treatment of patients with cancer and an established venous thromboembolism.

Rivaroxaban is an oral factor Xa inhibitor with similar efficacy to that of vitamin K antagonists during long-term treatment of pulmonary embolism with an improved benefit-risk profile [7].

It has similar efficacy to that of conventional anticoagulation therapy but a lower rate of major bleeding in patients with venous thromboembolism [8]. In addition, it does not require injections or regular dose adjustments. Nevertheless, it is not equally recommended in the treatment guidelines, as there is a lack of sufficient data on the efficacy of this anticoagulant in patients with cancer and thromboembolism. Although rivaroxaban is usually prescribed at a dose of 15 mg b.i.d. in patients with an acute stage pulmonary embolism, we prescribed 20 mg daily in the present case. We used heparin in the early stages and switched to the novel anticoagulant 30 days after starting anticoagulation therapy, which was 40 days after the development of symptoms associated with the pulmonary embolism. At that time, we decided to use 20 mg daily as the maintenance dose after the acute stage. The best treatment for an IVC filter thrombosis has not been determined but possible options include thrombolytic therapy, dose escalation, or switching to another anticoagulant, adding an antiplatelet agent [9], or mechanical thrombectomy [10]. In our case, we switched to warfarin, which was effective.

We presented a case of thrombotic occlusion of an IVC filter during maintenance with rivaroxaban. Multiple factors can contribute to an occluded filter, and it was difficult to determine the major cause in our case. More studies are needed to further clarify if anticoagulants have different effects. Until then, drugs must be chosen cautiously when treating patients at high risk for thromboembolism.

중심 단어: 하대정맥 필터; 혈전증; 리바록사반

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